COMPOSITE BEAM

BACKGROUND AND SUMMARY OF THE INVENTION

This invention relates to a structural beam and, in particular, to a structural beam that is a composite of metal and wood elements.

Light commercial and industrial structures, such as warehouses, are often constructed as wood frame structures in order to reduce the cost. Several types of large wood beams (24 inches to 4 feet high) are used for this purpose. The least costly of these beams are gluelam beams. Gluelam beams are well known and widely used but are dimensionally unstable. The larger the beam, the more this dimensional instability becomes a problem. At the other end of the spectrum, parallel strand lumber beams are very dimensionally stable, but their cost approaches that of steel beams. While the overall cost of constructing a building using parallel strand lumber beams is less than using steel beams, other advantages of steel often outweigh this relatively minor cost differential and large parallel strand lumber beams have not been widely used in light commercial and industrial buildings.

The subject invention provides a composite wood/steel beam having a cost which is compatible with gluelam beams and yet has the dimensional stability of parallel strand beams, or even steel beams. This is accomplished by providing a planer steel web with wood top and bottom flange pieces, which are separate from the web and from one another. The top and bottom flange pieces are attached to the top and bottom edges of the web respectively, with one top and bottom flange piece being on each side of the web.

The foregoing and other objectives, features, and advantages of the invention will be more readily understood upon consideration of the following detailed description of the invention, taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

FIG. 1 is a foreshortened perspective view showing a beam embodying the subject invention.

FIG. 2 is a cross-sectional view, at an enlarged scale, taken along the line 2-2 of FIG. 1.

FIG. 3 is a detail view, at an enlarged scale, of an alternative embodiment of the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to FIGs. 1 and 2 of the drawings, a beam 10 includes a planer web 12, the web 12 is preferably made from an elongate thin piece of a relatively high-strength metal, such as steel, however it can be any material that will withstand the load that will be transmitted to the resulting beam. The web has a length which is substantially equal to the desired length of the beam and a height which is substantially equal to the desired height of the beam. The thickness of the web depends on the size of the beam and the load it is intended to carry, but it is relatively thin.

Located respectively at the top and bottom edges of the web are flanges 14a and 15b. The flanges are separate from the web and separate flange pieces 16 are located on each side of the web. A plurality of holes 18 extend through the web at spaced apart intervals along its upper and lower margins. A plurality of similar holes 20 extend through the flange pieces 16, and the holes 20 are aligned with the holes 18 when the flange pieces overlie the top and bottom margins of the

web. Counterbores 22 are aligned with the holes 20 at the outside of each flange piece. Fasteners 24 extend through the holes 18 and 20 to secure the flange pieces to the web. In the embodiment illustrated, the fasteners 24 are bolts 26 which have heads 28 that fit within the counterbores at one side of the beam, and nuts 30 which fit within the counterbores at the other side of the beam.

The flange pieces preferably are made from a material that nails can be driven into, in order that the resulting beam can easily be utilized in conjunction with other wood elements. The flange pieces ideally are parallel strand lumber in order to also provide a high level of dimensional stability. High dimensional stability is particularly important where the flange pieces are separate from the web and attached to the web with fasteners because shrinkage of the flange pieces would cause their connection to the web to become loose. Alternatively, the flange pieces could be other wood products that have a reasonable level of dimensional stability or even simply be dimension lumber. The size of the flange pieces depends upon the size of the beam and the intended load. A representative beam, which would be used for roof or floor joists in a building, would have a web thickness of 1/8 inch to 1/2 inch, a web height of 1-4 feet and the flange pieces would be 3-1/2 inches wide. If it is necessary to have flanges which are larger than are available in one piece of lumber, multiple flange pieces 16 can be placed on each side of the web, FIG. 3.

The web 12 preferably will have central openings 32 located in it which will allow wire, cables, pipes and the like to be easily passed through the beam. The size, shape, location and number of openings will depend on the intended use of the beam, and a simple

circular opening is shown in the drawing for illustration purposes. The openings 32 and the holes 18 can be formed in the web in a single operation by stamping.

Due to its use of common, readily available materials, the beam of the subject invention is quickly and easily fabricated without requiring costly tooling or equipment. The beam of the subject invention provides the nailability and dimensional stability of a parallel strand lumber beam at a far lower cost than a beam made entirely of this material, and, in addition, provides performance which is comparable to metal beams.

The terms and expressions which have been employed in the foregoing specification are used therein as terms of description and not of limitation, and there is no intention, in the use of such terms and expressions, of excluding equivalents of the features shown and described or portions thereof, it being recognized that the scope of the invention is defined and limited only by the claims which follow.